

SUNSHINE AND RELATIVE HUMIDITY

More than the average amount of sunshine was received generally throughout the country during September, except in the far Northwest, much of the Lake region, northern New England, and southern Florida, where less than the usual amount prevailed. It was particularly large in the south-central Great Plains and eastward to the Atlantic. In the southern portion of the

Florida Peninsula the daytime sky was only 27 per cent clear, while in some sections of the northern portion of that State it was 70 per cent clear.

The relative humidity was above normal in the Ohio Valley, the Lake region, the far Southwest and southern Florida. Elsewhere, it was generally below the average, with departures mostly small, except in the central Great Plains where they were rather pronounced.

SEVERE LOCAL STORMS, SEPTEMBER, 1931

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path (yards)	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Eureka, Mo., and vicinity	1	5:15 p. m.	100	-----	\$25,000	Tornado.....	Buildings and other property damaged; 5 persons injured; path 1 mile long.	Official, U. S. Weather Bureau.
Knoxville, Tenn.	2	2:29 p. m.	-----	-----	2,000	Thunderstorm....	Tower destroyed by lightning; power and telephone service impaired.	Do.
Reading and Berks County, Pa.	2	P. m.	-----	-----	25,000	Electrical and rain.	Barns and sheds burned; highways blocked by broken trees; heavy property damage at Meritztown.	Do.
Lebanon, Ind. (6 miles southwest)	3	-----	-----	-----	7,500	Electrical.....	Barn and contents burned.....	Do.
Shelbyville, Ind. (2 miles east)	3	-----	-----	-----	20,000	-----do-----	A hangar, 4 planes, 3 trucks, and a tractor burned.	Do.
Muskingum and Noble Counties, Ohio	4	P. m.	-----	-----	10,000	Hail.....	Considerable damage to crops and buildings....	Do.
Grand Rapids (near), Mich.	4	-----	-----	-----	25,000	Electrical.....	Amusement park and church damaged by lightning.	Do.
Port Arthur, Tex.	5	-----	-----	-----	-----	Wind and rain squall.	Trees uprooted; tanker broke away from dock causing some damage.	Do.
Atoka, Okla.	6	5 p. m.	440	1	-----	Wind.....	Ball park grandstand demolished; roofs torn off; windows broken; wires and trees blown down; path 2 miles long; 4 persons injured.	Do.
Palermo, Me.	6	P. m.	-----	-----	-----	Probably tornado.	Buildings demolished or moved; several persons hurt.	Washington (D. C.) Post.
La Porte, Tex.	10	3 p. m.	-----	-----	-----	-----do-----	Timber and awnings damaged in bay-shore area.	Official, U. S. Weather Bureau.
Cascade and Teton Counties, Mont.	10	-----	-----	-----	-----	Hail.....	Chief damage to crops.....	Do.
Dane, Jefferson, Waukesha, Milwaukee, Ozaukee, Door, Brown, and Calumet Counties, Wis.	12	2:30 - 5:30 p. m.	-----	-----	217,000	Wind and thunderstorms.	Wires, poles, trees, and signs blown down; windows broken; barns wrecked.	Do.
Adrian, Mich.	12	-----	-----	-----	-----	Rain, hail, and wind.	Light poles, trees, and other property considerably damaged.	Do.
Glacier County, Mont.	12	-----	-----	-----	-----	Hail.....	Crops damaged.....	Do.
Fayette and Ross Counties, Ohio	14-17	-----	-----	1	-----	Wind, electrical and rain.	Much damage to property by flooding; several injured and 45 stunned by lightning.	Do.
Canton, N. Y. (vicinity of)	15	-----	-----	-----	10,000	Electrical.....	Large barn and other buildings burned or damaged.	Do.
Thornburg, Kans. (3 miles southeast)	18	6:30 p. m.	-----	-----	-----	Tornado.....	Number of farm buildings wrecked; path 4 miles long.	Do.
Knoxville (near), Tenn.	19	2:50 p. m.	-----	-----	8,000	Thunderstorm....	Barn and contents burned; farm machinery damaged.	Do.
Hanlontown (near), Iowa	19	7:30 p. m.	-----	-----	8,200	Tornado.....	Buildings damaged; livestock killed; path 5 miles long.	Do.
Clay and Palo Alto Counties, Iowa	19	P. m.	-----	-----	12,000	Wind and rain....	Trees, small buildings, windmills and electric wires damaged; some small buildings wrecked.	Do.
Crawford and Humboldt Counties, Iowa	19	-----	-----	-----	-----	Wind.....	Roofs and chimneys damaged; corn blown down.	Do.
Linn and Sioux Counties, Iowa	19	-----	-----	-----	-----	Rain and flood....	Sewers flooded; railroad washed out; train derailed.	Do.
Buena Vista County, Iowa	20	4-4:10 p. m.	1,760	-----	5,000	Hail.....	Windows and auto tops pierced; corn injured....	Do.
Slaton (near), Tex.	20	8:15 p. m.	3,520	-----	30,000	Wind.....	Chief damage to buildings; some crop injury; path 20 miles long.	Do.
Cass and Monona Counties, Iowa	20	-----	-----	-----	12,000	Wind and hail....	Auto tops, roofs and windows pierced; corn injured; electric wires damaged.	Do.
Grantsburg, Wis.	20	-----	-----	-----	-----	Hail.....	Crops and trees considerably damaged.....	Do.
Tama County, Iowa	20	-----	-----	-----	-----	Wind.....	Awnings and store fronts damaged; small buildings demolished; 20 electric poles blown down.	Do.
Davis County, Iowa	21	3:15-3:30 p. m.	100	-----	400,000	Tornado, wind and hail.	Trees mutilated; houses, barns and windmills wrecked; 600 homes unroofed; overhead wires damaged; 20 persons injured; path 11 miles long.	Do.
Van Buren, Jefferson, Henry, Washington, and Louisa Counties, Iowa	21	3:30-4:30 p. m.	33-100	2	125,000	Tornado.....	Damage confined to rural districts; overhead wires damaged; livestock killed; 8 persons injured; path 50 miles long.	Do.
Labette, Cherokee and Crawford Counties, Kans.	21	4:10-4:30 p. m.	880	2	50,000	-----do-----	Practically every building at Oswego fair grounds damaged; heavy property damage elsewhere; path 35 miles long.	Do.
Lamar (near), Mo.	21	5 p. m.	1,760	-----	2,000	Small tornado....	Barn, silo and some small sheds blown down....	Do.
Poweshiek County, Iowa	21	do.	-----	-----	8,000	Wind.....	Farm buildings and trees damaged; airplane wrecked.	Do.
Scott County, Iowa	21	5:30 p. m.	-----	-----	5,000	Hail and wind....	Roofs and windows pierced; corn stripped.....	Do.
Arnett, Okla. (2 miles northwest)	21	7 p. m.	200	-----	1,200	Wind.....	Damage to property other than crops; path 4 miles long.	Do.
Columbia, Mo. (southern part)	21	do.	2 blocks	-----	20,000	Small tornado....	City and university buildings damaged; 1 person injured.	Do.
Oxfordville (near) to Oconomowoc, Wis.	21	7:30-9 p. m.	200	1	300,000	Possibly 2 tornadoes.	Many farm buildings wrecked; crops ruined; over 40 families reported homeless or in need of aid; 9 persons injured; path 50 miles long.	Do.
Pittsfield, Ill.	21	-----	-----	-----	10,000	Wind.....	Poles and trees blown down; roofs damaged; wire service temporarily cut off.	Do.
Overbrook, Kans., and vicinity	22	4:10 p. m.	1,760	-----	3,000	Tornadoic wind....	Farm buildings, growing crops and telephone wires damaged; path 2.5 miles long.	Do.
Butler County, Iowa	23	4:30 p. m.	-----	-----	4,000	Wind.....	Several small buildings and roofs damaged; trees uprooted; auto tops torn; 2 persons injured.	Do.

Severe local storms, September, 1931—Continued

Place	Date	Time	Width of path (yards)	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
New Mexico (northern Rio Grande area).	23-24					Floods	Highways, railway, fields and crops damaged; homes flooded.	Official, U. S. Weather Bureau.
Norway (near), Kans.	24	7:30 p. m.	880		5,000	Tornado and hail	Livestock killed; crops injured; 10 persons hurt; path 8 miles long.	Do.
Rush County, Ind. (central).	25	2 p. m.	440-880			Thunderstorm and wind.	Considerable damage to buildings; telephone service interrupted.	Do.
Boston, Ind.	25	2:45 p. m.	100-130		100,000	Tornado	2 school buildings and a number of dwellings damaged; crops hurt; 25 persons injured.	Do.
Grayville (near), Ill.	25				4,500	Wind	Buildings damaged.	Do.
Anderson, S. C.	26	A. m.			10,000	Thunderstorm	Several barns and contents destroyed by lightning.	Do.

RIVERS AND FLOODS

By MONTROSE W. HAYES

[In charge River and Flood Division]

Local overflows in small streams occurred in September in northwestern New York, Ohio, Michigan, Wisconsin, and New Mexico. The resulting damage was of minor consequence. A few rivers rose to stages slightly above bankful, as shown in the following table, but the only damage reported was in New Mexico, near Espanola, where there was estimated damage of \$1,500 to highways, and \$500 to crops:

Table of flood stages in September, 1931

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
	<i>Feet</i>			<i>Feet</i>	
Roanoke: Williamston, N. C.-----	9	1 26	1	9.9	1 31
Peedee: Poston, S. C.-----	18	1 29	1	18.9	1 31
MISSISSIPPI SYSTEM					
<i>Missouri Basin</i>					
Big Blue: Blue Rapids, Kans.-----	20	25	26	20.8	25
Grand:					
Gallatin, Mo.-----	20	26	26	23.3	26
Chillicothe, Mo.-----	18	26	27	20.8	26
<i>Ohio Basin</i>					
White, West Fork: Edwardsport, Ind.-----	10	17	18	12.0	18
WEST GULF OF MEXICO DRAINAGE					
Rio Grande: Espanola, N. Mex.-----	7	24	24	8.1	24

¹ In August.

All dates are in September, unless otherwise indicated.

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[By the Marine Division, W. F. McDONALD in charge]

PRELIMINARY NOTE

The most important feature of the weather of the month from the marine standpoint was the occurrence of an unusual number of tropical disturbances, seven in American waters and at least four in Asiatic waters. The American group affected the Caribbean area, the Yucatan Peninsula, Mexico, and the Pacific coastal waters adjacent to Mexico, with one hurricane producing a major disaster at Belize, British Honduras, on September 10. Special articles appear elsewhere in this issue covering the American disturbances and the first of the typhoons. The discussion has therefore been limited to brief mention in those cases below.

NORTH ATLANTIC OCEAN

By W. F. McDONALD

The pressure situation.—Average pressures for the month of September were much above normal in the region of the northeastern Atlantic, with the Shetland Islands apparently at the center of the pressure anomaly. On the other hand, the barometer averaged lower than normal over much of the western Atlantic, centering about Newfoundland and Nova Scotia, with the Gulf and West Indies showing a slight excess of pressure north of the twentieth parallel of latitude and a slight deficiency in the Caribbean Sea and Central America.

In so far as the averages for the month may be said to have significance, they represent a displacement of the normal North Atlantic HIGH northeastward, with a corresponding displacement of the LOW center of action to westward, so that the latter (resulting in fact from the combination of several separate movements of centers of low barometric pressure) obtained sway over the region of the northwestern Atlantic, Greenland, and Labrador. The mid-Atlantic HIGH was seldom well developed in the region between the Azores and Bermuda, the crest of this ridge probably being displaced southward during much of the month.

Early in the month, the movement of LOWS into the Atlantic was on an unusual track, almost due eastward along the latitude of 40°, the disturbances being as a rule but weakly developed, but nevertheless persistent in their progress eastward over the area normally occupied by well-developed HIGH formations. After the 6th a persistent HIGH was set up over the British Isles that lasted almost continuously until the 30th.

Beginning about the 10th, the LOWS over the northwestern Atlantic and adjacent land areas became more intense and in general moved slowly northeastward, crossing Greenland and passing mostly to the northward of Iceland. These developments culminated in an exceptionally deep cyclonic depression, season considered, which was central over the Strait of Belle Isle on the 25th, with minimum pressure below 29 inches.